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ABSTRACT

The potential for using a computerized communication system to facilitate resource sharing in New England has been investigated by the staff of the New England Information Network (NELINET). The central purpose of their research was to determine whether a strategy for load leveling of interlibrary loan (ILL) requests could be implemented online as part of the regional ILL system. The first year's project report includes: (1) results and analysis of a Base Line Statistical Survey used to collect data about ILL traffic; (2) discussion of the mathematical model used to test market value strategies and analysis of their effectiveness for load leveling; (3) description of the services and information to be provided by the system in an on-line mode; (4) evaluation of how effectively the market value strategy could bring about load leveling in a regional ILL system; (5) summary of project tasks; (6) information dissemination activities of the project; and (7) a review of significant evaluations made during the project. A series of screen displays developed to demonstrate ways in which a market value strategy might be presented to users, data requirements of the proposed system, and ILL goals and objectives are included in the appendices. (Author/JPF)

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DEMONSTRATION AND EVALUATION OF THE EFFECTS OF INCENTIVES ON RESOURCE SHARING USING A COMPUTERIZED INTERLIBRARY COMMUNICATIONS SYSTEM

Final Report
covering the period
September 1, 1976 - August 30, 1977

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FOREWORD

This report summarizes progress from September, 1, 1976 through August 30, 1977 on a project to develop a load-leveling strategy for resource sharing in New England. It is the final report on work resulting from a research grant to the New England Board of Higher Education.

The sponsor of the grant is the United States Office of Education - Library Research and Demonstration Program under the Higher Education Act of 1965 - Title II-B.

PREFACE

Many people have been involved in the conception and implementation of this project. A special note of appreciation must go to Ronald F. Miller, Executive Director of the California Library Authority for Systems and Services, who was NELINET's Director when this project was initiated; to James Wolper, Systems Consultant, who performed most of the computer applications for the research; and to William D. Mathews, formerly NELINET's Director for Systems, now with NCLIS, whose guidance was instrumental in carrying out every aspect of the project.

I would also like to thank the members of the NELINET Committee on Interlibrary Communication for the many hours they have contributed and the recommendations they have made as representatives of the NELINET membership.

Libby Trudell
Research Analyst

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A. Screen Formats for Load-leveling Module
B. Data Requirements of the ILL System
C. CILC Members
D. Project Calendar
E. Service Goals and Objectives of the Interlibrary Loan System, rev., March 1977

I. INTRODUCTION

During the past year, the potential for using a computerized communications system to facilitate resource sharing in New England has been investigated by the staff of the New England Library Information Network (NELINET), a program of the New England Board of Higher Education. The NELINET Committee on Interlibrary Communication (CILC), whose members represent NELINET libraries throughout New England, served as a reactor and review board for this research.

This final report presents a comprehensive summary of the project activity funded by a grant from the U.S. Office of Education and of the design of the NELINET ILL system which provides the context for this research.

The proposed NELINET ILL system will be compatible with the ILL system being developed at the Ohio College Library Center (OCLC) and will offer enhancements to improve ILL on the regional level. The central purpose of the research supported by the U.S. Office of Education has been to determine whether a strategy for load-leveling of ILL requests can be implemented as part of the regional ILL system.

During the first six months of the project, initial research activities were completed. These included a review of the literature on computerized ILL, as is briefly described in Section VII of this report. The full review was published in the second quarterly report of this project, and is available from NELINET.

The Committee on Interlibrary Communication designed and distributed an ILL Base-Line Statistical Survey to obtain information about ILL traffic in New England during the same time period. Section II of this report presents the final results of that survey and an analysis of the ILL activity revealed by the data reduction.

Section III of this report describes the mathematical model of the ILL system which was used to test strategies for load-leveling, and analyzes the effectiveness of these strategies.

As a context for the project-related research, some of the goals of the NELINET ILL system are described in Section IV. The section explains how the characteristics of the proposed system address these objectives, and also outlines how a load-leveling strategy could be incorporated into the system. The data elements identified for the system are attached (Appendix B).

Section V presents an evaluation of the market value concept as it has been developed in the research, including comments by the CILC and project staff. It discusses some problems and some alternative suggestions for encouraging load-leveling.

As this is the concluding report of the project, a summation of the tasks to be completed in the course of this research is included in Section VI. Each task cluster is briefly described as stated in the original project proposal, followed by an assessment of the value of each task within the project. The project calendar from the grant proposal is appended to this report (Appendix D).

Section VII of the report describes the way in which information about the project was disseminated to the target population and to the library community as a whole. The final section briefly reviews the most important evaluations made in the report as a summary of the project.

Research will continue under a second grant from the U.S. Office of Education, effective September 1977 and continuing through August 1978. During this time period, an operating ILL system will be implemented in test mode at NELINET, and the design specification and the market value module developed during the past year will be tested in that environment. NELINET is pleased to have had the opportunity to participate in this project and to work toward the goal of providing better ILL service in New England.

II. STATISTICAL SURVEY OF INTERLIBRARY LOAN TRAFFIC IN NEW ENGLAND

A major task of this project was to design, distribute and analyze a sample survey on ILL traffic in New England. Data gathered during the survey were intended for use:

1. as a base against which to measure the impact of the operating ILL system,

2. in the design of a mathematical model to test techniques for load-leveling of ILL requests, and

3. in the evaluation of a number of pertinent questions about ILL activity in New England.

Evaluation of the data provides evidence to affirm certain premises about ILL activity. However, other widely held assumptions are called into question by the results.

METHOD

The survey was designed by the CILC. Each institution participating in the survey recorded data for borrowing and lending transactions for the period of one month or 30 transactions, whichever came first. Those libraries exceeding 30 transactions in one month also recorded the total activity for each type of transaction. Data about turnaround time, fill rates, verification procedures, types of material, and the flow of borrowing and lending among different types of libraries and different states were recorded.

The survey recipients included all NELINET members at the time of the survey (62 direct and 44 indirect or consortium members). A nearly equal number of nonmember libraries throughout the region comprised the rest of the sample; the number of nonmember recipients was distributed equally in each of the six states. Public libraries of all sizes were included in the sample and libraries from private, state and community colleges were represented. Although the size of the sample was small (191 total recipients) this diversity makes it a meaningful representation of New England's interlibrary loan traffic.

Of the 118 survey forms which were returned, five forms were incompletely filled out and not usable. The geographic distribution of returns showed a heavy percentage of respondents from Connecticut and Massachusetts, influenced by the large number of NELINET libraries in these states. The overall response was 58%, mail losses accounting for a large percentage of nonresponses. Other reasons noted were lack of staff time and belief on the part of small libraries that their low level of activity would not be of sufficient impact to be included.

Charts I and II show a breakdown of the respondents to the survey by type and size.

CHART I

SURVEY SAMPLE BY LIBRARY TYPE AND SIZE

ALL RESPONDENTS

	Large	Medium	Small	Total	% of n (n = 113)
Academic	22	37	12	71	63%
Public	6	16	10	32	28%
Special	--	--	10	10	9%
All Libraries	28	53	32	113	100%

Large = 300,000+ titles (including extra-large libraries)
Medium = 50,000 - 300,000 titles
Small = up to 50,000 titles

CHART II

SURVEY SAMPLE BY LIBRARY TYPE AND SIZE

NELINET LIBRARIES ONLY

	Large	Medium	Small	Total	% of n (n = 53)
Academic	22	15	5	42	80%
Public	5	2	--	7	13%
Special	--	--	4	4	7%
All Libraries	27	17	9	53	100%

Large = 300,000+ titles (including extra-large libraries)
Medium = 50,000-300,000 titles
Small = up to 50,000 titles

EVALUATION OF DATA

The results of the survey have been quantified and evaluated in order to address the following questions about ILL activity which relate to the development and evaluation of a computerized ILL system. A discussion of the questions follows.

1. WHAT DISTINCT BORROWING AND LENDING PATTERNS ARE SHOWN BY LARGE LIBRARIES AND SMALL LIBRARIES?

It is a truism of ILL that large libraries receive an unequal share of ILL requests. This was borne out by the survey data, which showed that 29% of all lending in the survey period was done by five very large libraries, which accounted for only 11% of the borrowing. One of the libraries had a borrow/loan imbalance of 1 to 5. These patterns are comparable to the lending patterns of very large academic libraries reported by the Westat study[1] for the Association of Research Libraries (ARL). These five libraries each have collections of over 1,000,000 and were far larger than the next largest libraries.

It was expected that the data would show a direct relationship between size and ILL activity for all libraries, with borrowing leveling off and lending increasing with library size. In the sample as a whole there were 54 net borrowers and 59 net lenders. Of the 19 large libraries, only four were net borrowers, indicating the expected correlation between size and activity. However, no clear correlation was shown for the 85 libraries under 300,000 (classed as small and medium in size in the sample). Fifty (or 59%) were net borrowers and 35 (or 41%) were net lenders. The borrowers and lenders were distributed randomly rather than being grouped by size (see Chart III). Some very small libraries loaned as much as ten times more than they borrowed, a behavior especially evident of the special libraries in the sample. Thus, we see that library size can be correlated with a library's status as a net borrower or net lender if a library is larger than 300,000. However, the activity of small and medium-sized libraries is unpredictable and dependent upon other factors such as subject strengths, geographic location, etc.

Most small libraries, whether net borrowers or net lenders, had a very small volume of ILL traffic. Contrary to expectation, borrowing tends to increase with size of library. This can be seen in Chart IV, where the small libraries are clustered around zero borrowing activity. Of libraries with holdings under 100,000, only 16% borrowed more than 40 items in one month, while 28% borrowed under ten items. Of libraries with holdings of 100,000 to 200,000, 36% of the libraries borrowed more than 40 items, and only 20% borrowed less than ten items. The

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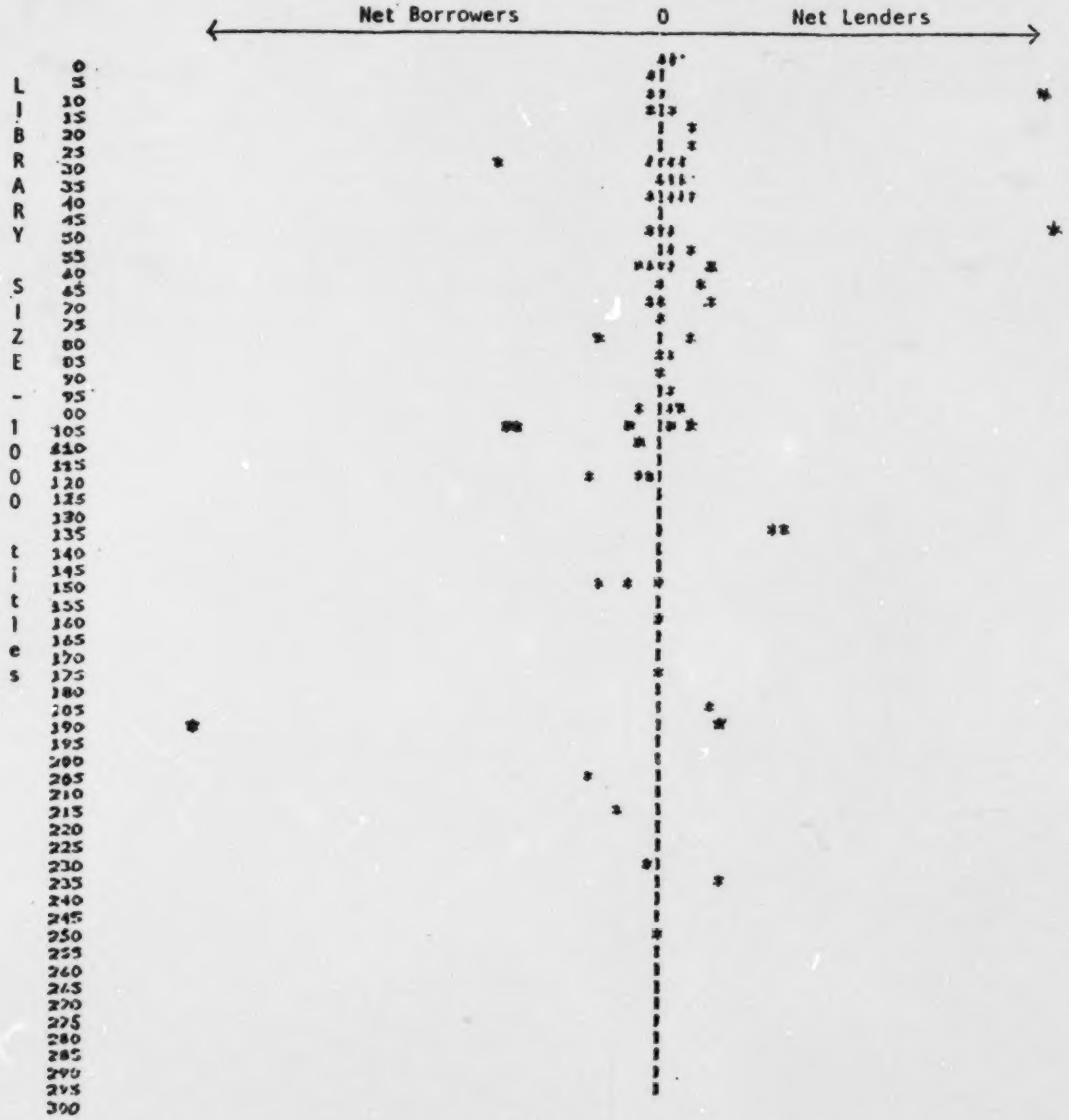
1. Palmour, Vernon, and others, *A Study of the Characteristics, Costs, and Magnitude of Interlibrary Loans and Academic Libraries* (Westport, CT: Greenwood, 1972).

borrowing activity continues to increase correspondingly with size of the library. The conclusion can be drawn that large libraries, although lending heavily, also borrow heavily.

CHART III

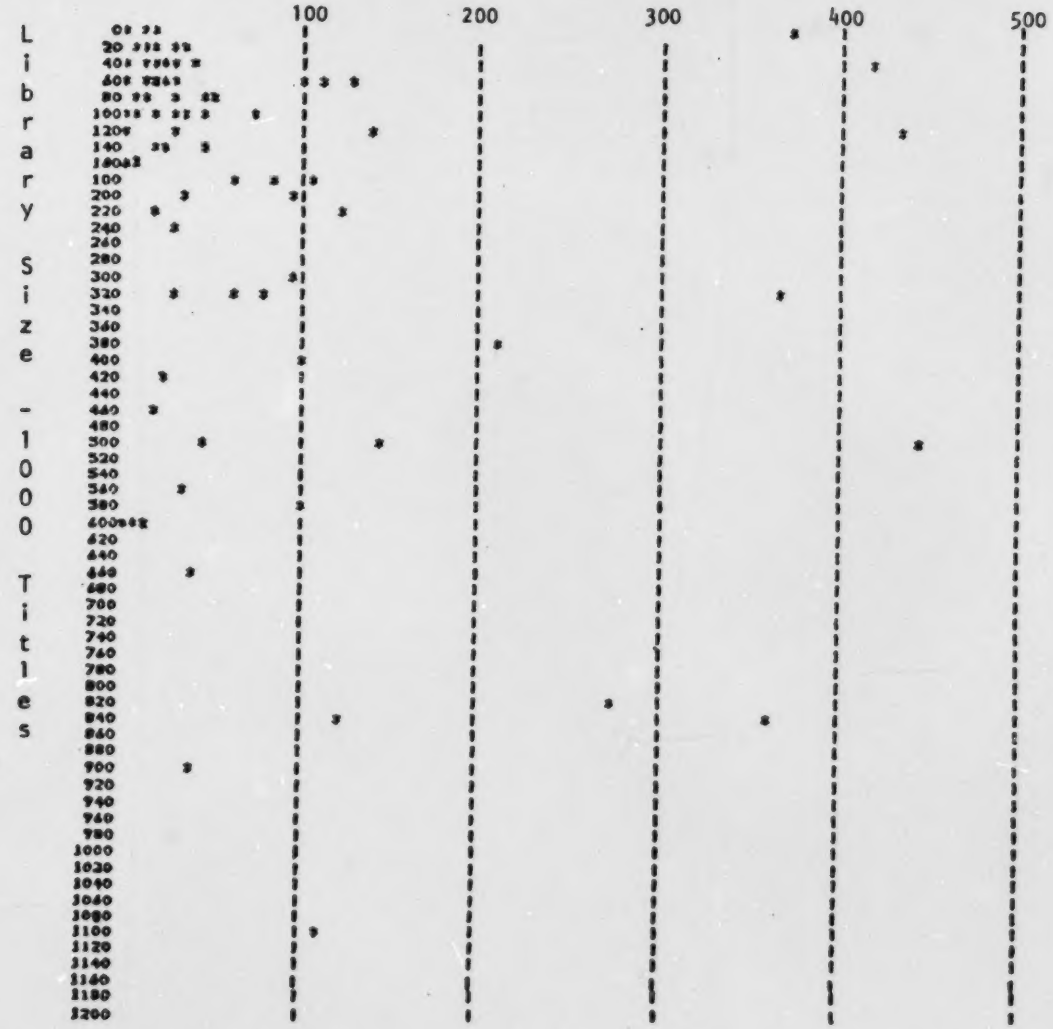
BORROW/LOAN DISTRIBUTION OF SMALL AND MEDIUM-SIZED LIBRARIES
(Less Than 300,000 Titles)



Each * represents a library's distance from perfect reciprocity.

CHART IV

BORROWING ACTIVITY IN SAMPLED LIBRARIES



2. WHAT IS THE FLOW OF ILL TRAFFIC AMONG TYPES OF LIBRARIES?

The survey data show conclusively that most ILL is among libraries of the same type. Public libraries transact 80% of their ILL with publics and academic libraries transact 66% of their ILL with other academics. Special and public libraries borrow at an almost perfectly even rate from each other.

CHART V

ILL AMONG TYPES OF LIBRARIES

AVERAGE NUMBER OF ITEMS PER INSTITUTION

Loaned From \ Borrowed by	Academic	Public	Special	Total Loans
Academic	29.5	9.4	5.8	44.7
Public	5.2	23.7	.4	29.3
Special	5.3	1.8	2.3	9.4
Total Borrows	40.0	34.9	8.5	

Chart V shows a definitive imbalance between the lending activity of academic and public libraries. Academic libraries loaned an average of 9.4 items per month to public libraries, while borrowing 5.2 items per month, for a nonreciprocity ratio of 1 to 1.8. This kind of imbalance will not be addressed directly by the load-leveling module of the proposed NELINET ILL system; however, reducing the load on large libraries may improve this ratio.

Chart V also shows a greater volume of lending by academic than by public libraries, at a ratio of 1 to 1½. Since there are more large academic than large public libraries in the sample (see Chart I), it is possible that the volume imbalance is a factor of the size of the libraries rather than type. It would be helpful to construct a chart which shows the percentage of items borrowed by large libraries from medium, small from large, medium from medium, and so forth, so that some determination could be made about the nature of ILL traffic between different sizes of libraries. Unfortunately, the survey data do not provide that information, so it can only be conjectured that the low activity which the data show for small libraries (see Chart IV)

indicates that the individual small library, public, academic or special, places little drain on the ILL system. Especially evident of this is the fact that the special libraries, all small in size, had an almost exactly 1 to 1 borrow/loan ratio. This point should be dealt with, and will be included in the survey analysis of the test mode of the ILL system.

Some speculation can be made about the actual effect of the borrow/loan imbalance between public and academic libraries on the institutions. Items lent between public and academic libraries comprise 18% of all public activity and 21% of all academic activity. Thus, each library individually is handling a similar average percentage of its total workload for the other. This may indicate that academic libraries, because of their larger overall volume of lending, can absorb the demand made by public libraries. This theory is reinforced when the average number of items being loaned to public libraries from each academic library is considered: There is a difference of only four items in the number loaned by academics to publics, about 10% of total academic loaning.

Thus, the survey data confirm the supposition that borrowing by public libraries is not reciprocal with the amount lent by public libraries to academic libraries. Since the demand by public libraries represents a fairly small percentage of academic activity, it may be that this is a supportable imbalance with the system.

3. HOW MUCH IS THE OCLC DATA BASE BEING USED FOR PURPOSES OF ILL VERIFICATION?

On the average, libraries in the sample with access to a terminal (NELINET members only) verified 28% of all transactions on the OCLC data base. Chart VI breaks this activity down according to type and size of library.

Most NELINET members used the OCLC system to verify their own borrowing requests more often than they received requests that had been so verified. However, this behavior is reversed for small academic libraries in the sample. While verifying 19% of their borrowing requests via OCLC, 29.5% of the loan requests they received had been verified by OCLC. It may be concluded that small academic libraries are attracting more ILL requests simply by the existence and visibility of their holdings symbol in the data base.

It should be noted that the survey results on this point are not fully reliable, as some participants expressed confusion over the term "verification." The intent of the survey was to determine OCLC system use for verification of location. Many participants assumed that bibliographic verification of the citation was intended. Despite this inconsistency, the results show a significant use of the data base for ILL activity.

CHART VI

NELINET MEMBERS' TRANSACTIONS VERIFIED IN OCLC

LIBRARY	TOTAL	LOANS	BORROWS
Large Public	26.1%	13.0%	39.2%
Medium Public	52.9%	53.8%	50.0%
Large Academic	13.7%	11.3%	16.27%
Medium Academic	18.5%	15.5%	21.5%
Small Academic	24.1%	29.5%	18.8%
Special	33.6%	14.0%	53.3%

4. WHAT IS THE AGE OF MATERIALS REQUESTED VIA ILL?

Chart VII confirms a widely accepted view of the age of materials loaned through ILL. Forty percent of the requests recorded during the survey period were for materials published in the last three years. Only one request in ten was for an item published more than 20 years ago. After 20 years, the decline in number of requests per year levels off, so that a request for an item published in 1945 is as likely as for an item from 1909.

It should also be noted that the high percentage of recent items indicates that most libraries are borrowing and loaning items which are in print, despite the ALA code which prohibits requests for such items.

5. IS MOST ILL WITHIN STATE AND REGIONAL BOUNDARIES?

It was expected that the survey data would reveal existing dependencies among the states, showing whether any one state is a heavy net borrower or net lender. Another aspect of this question was to determine the amount of ILL activity which goes on between New England and the other areas of the country. The data in Chart VIII show some interesting results on a state by state basis.

CHART VII

NUMBER OF ITEMS REQUESTED BY DATE

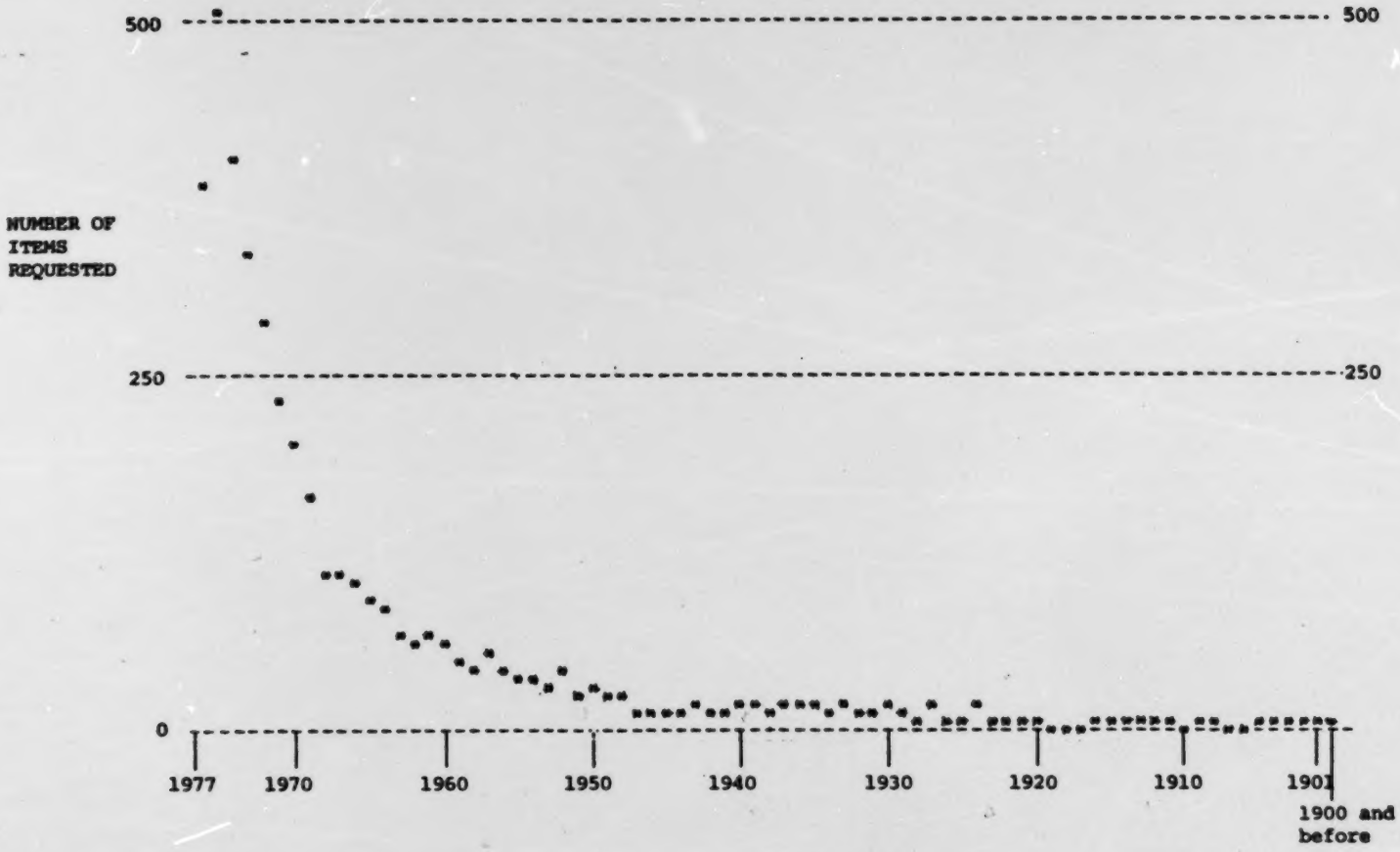


CHART VIII

NEW ENGLAND ILL TRAFFIC FLOW

	In-State		Out-of-State (total)		Out-of-State Within New Eng.		Outside New Eng.	
	Loans	Borrows	Loans	Borrows	Loans	Borrows	Loans	Borrows
CT	80.0%	83.0%	20.0%	17.0%	13.8%	13.0%	6.2%	4.0%
MA	79.0%	80.5%	21.0%	19.5%	9.4%	8.1%	11.6%	11.4%
ME	77.0%	74.0%	23.0%	26.0%	10.4%	11.5%	12.6%	4.5%
NH	94.0%	95.0%	6.0%	5.0%	4.1%	3.9%	1.9%	1.1%
RI	68.0%	76.0%	32.0%	24.0%	16.4%	14.9%	15.6%	9.1%
VT	71.5%	68.0%	28.5%	32.0%	23.6%	18.7%	4.9%	13.3%

Almost all activity in New Hampshire is in-state (95%). This reflects a policy of the New Hampshire State Library not to route requests outside the state. As the number of requests which cannot be filled in-state is likely to be the same as in other states, which appear to fill between 20 to 30% of requests out-of-state, there may be a significant number of unfilled requests in New Hampshire.

Rhode Island's ILL traffic shows the highest ratio of out-of-state loans compared to borrows: 32% to 24%. Rhode Island libraries also loan a high percentage of items out of New England--15.6%--so Rhode Island is the only New England state which is a significant net lender to other areas of the country.

Connecticut and Massachusetts resemble each other--each lends slightly more than it borrows, but to such a small degree as to be almost insignificant. The amount which each state loans and borrows within its own boundaries is practically the same. Massachusetts has more interaction with libraries outside of New England than does Connecticut.

Maine and Vermont show some similar behavior patterns, being more dependent on out-of-state sources for borrowing than the other states. Vermont depends on outside sources for 32% of its borrowing, while Maine depends on out-of-state for 26% of all borrowing. Vermont is the only state which is a consistent net borrower. Maine shows a relatively high percentage of loaning out of New England. This may reflect the fact that the NELINET members in Maine include several large public libraries, which is not a general characteristic of NELINET membership. These libraries are very visible because of their access through the OCLC data base, and the higher percentage of public libraries in the other regional networks may cause a heavy load on resources of Maine's public libraries.

Generally, the survey data make it clear that the great majority of all ILL transactions in New England are within state boundaries. The states are fairly self-sufficient at this time, with sophisticated ILL procedures already established.

6. WHAT TURNAROUND TIMES ARE REVEALED BY THE SURVEY?

The data show that the average in-house turnaround time achieved by libraries in the survey was 2.5 days. Over 85% of all requests were answered within three days and 32% were answered in less than a day. Only five libraries had an average in-house turnaround time longer than a week.

Although in-house turnaround time is fairly constant, total turnaround time--from initiation of request to receipt of the item at the borrowing library--varies significantly. Chart IX shows that receipt of an item borrowed in-state averages 8.5 days, whereas out-of-state transactions can average as much as 26 days. The average overall turnaround time shown by the survey is 10.5 days.

CHART IX

STATE-TO-STATE TURNAROUND TIME (DAYS)

Borrowed By	Borrowed From: CT	MA	ME	NH	RI	VT	XN*
CT	6	13	5	16	16	0	14
MA	19	7	12	20	22	16	17
ME	17	16	7	16	15	13	15
NH	26	12	0	11	0	10	22
RI	13	19	13	10	9	0	19
VT	0	15	0	0	0	11	14

* XN = outside of New England

7. IS TURNAROUND TIME INTERRELATED TO THE AMOUNT OF LENDING BEING DONE BY A LIBRARY?

The average turnaround time of the 27 libraries which loaned over 100 items in one month was 3.6 days, slightly higher than the 2.5 average achieved overall. Only eight of these libraries had turnaround times longer than the seven days. It would appear that turnaround time does slow down in some highly impacted libraries; however, the library in the sample which did the most loaning (1018 items) had a turnaround time of 2.3 days. This indicates that there may be other factors, such as size of ILL staff, which have an effect on delay.

8. WHAT PERCENTAGE OF REQUESTS ARE BEING SATISFIED?

The overall fill rate for the requests made to the libraries in the survey was 93.6%. This rate reflects only the final transactions for items which may have been referred several times; thus, it is unrealistically high. The survey data do not show first try fill statistics. However, the results indicate that a large percentage of the requests being made to libraries in New England are being filled.

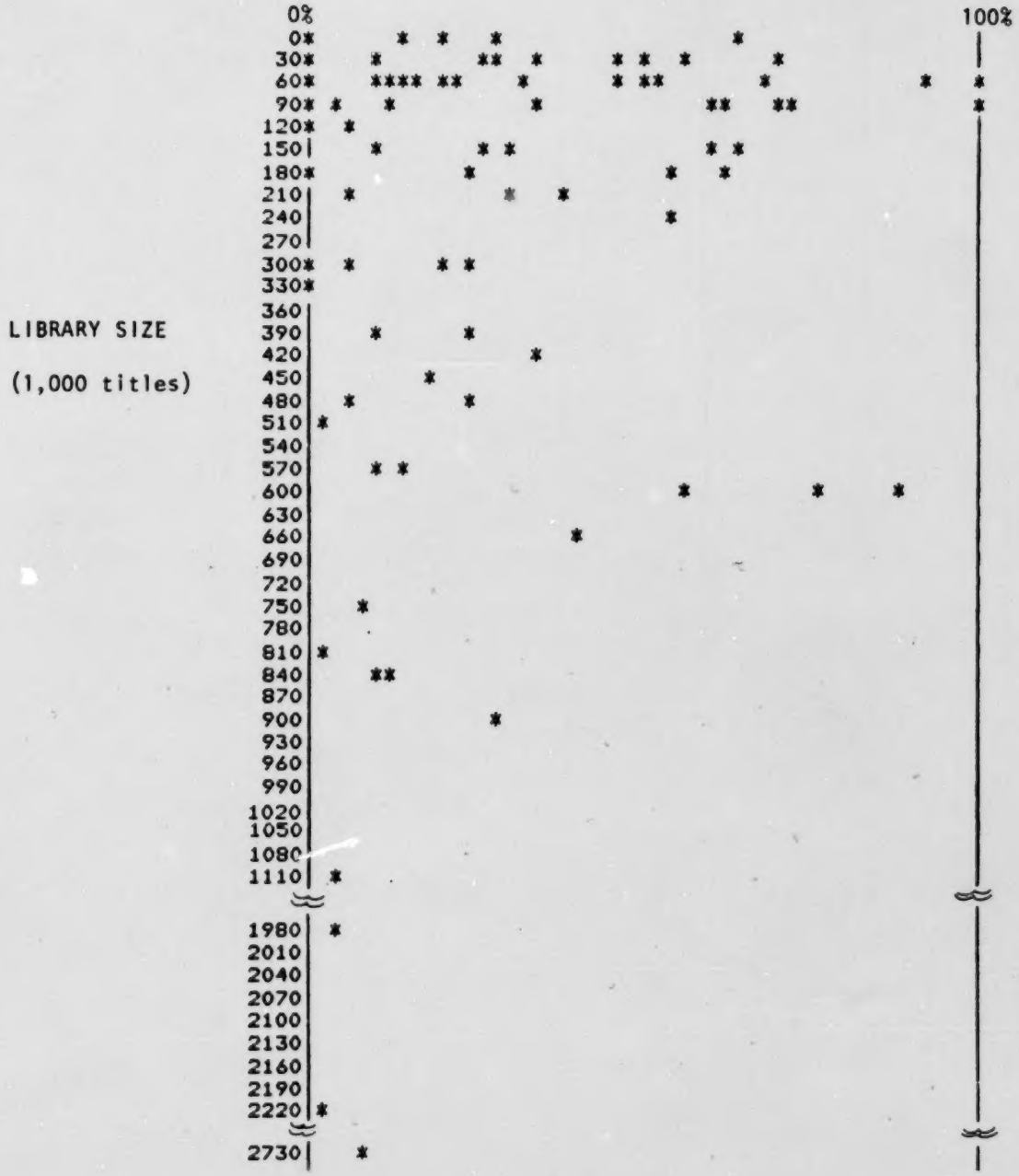
The survey data show somewhat different fill rates for the different types of libraries.

Academic libraries had the highest fill rate, with 96.5% of all requests made to these libraries being filled. Public libraries also showed a high fill rate, with 86.6% of all requests to them being filled. Special libraries drop to 79% filled; however, the low number of special libraries in the survey (only ten libraries) makes it difficult to justify drawing any conclusions about special library behavior in general.

Chart X shows that the percentage of requests left unfilled tends to be higher in smaller libraries. This result is affected, however, by the number of requests each library receives. When a small library fills 2 out of 3 requests, its percentage of requests unfilled is 30%. Thus, the graph is somewhat deceptive in characterizing fill rates.

CHART X

PERCENTAGE OF UNFILLED REQUESTS



CONCLUSIONS

The survey data indicate that New England libraries are successfully filling a high percentage of ILL requests, and are filling them quickly. In-house ILL activity occurs within an average of 2.5 days, but actual time elapsed between initiating a request for a loan and receiving it is considerably higher: it would seem that an automated system such as that proposed by NELINET could provide significant improvement of service in this respect.

The survey does not reveal the nature of the complex hierarchical systems which have been developed for public libraries by the New England states, but it does indicate that these systems are successful in filling ILL needs for their patrons.

As expected, large libraries in the survey lent significantly more than they borrowed. However, the activity of small and medium-sized libraries varied to the extent that no generalization can be made about their ILL behavior. It can be assumed that many small libraries are probably under-utilized for ILL because of lack of information about their holdings. A correlation can be drawn from the survey data between library size and volume of ILL activity: ILL activity, loaning and borrowing, increases steadily as size of the library increases.

Most transactions occur within state boundaries, and 82.2% of all requests were transmitted within the New England region. A similar tendency can be seen among the different types of libraries, as public libraries usually borrow from other publics and academics borrow mainly from academics. Special libraries show more interaction with academic libraries than with other special libraries.

Results based on a limited survey cannot be considered a definitive portrait of New England ILL activity. However, it is a fair representation of the behavior of NELINET members, and, as such, is certainly valuable in the design of an ILL system which initially will be primarily for that constituency.

As a sampling of many types of New England libraries, the survey provides a useful outline of ILL traffic within the region. The needs of libraries not represented in the survey will be further explored as part of the development of the ILL system.

III. A MODEL OF THE NELINET COMPUTERIZED ILL SYSTEM: TESTING STRATEGIES FOR LOAD-LEVELING

In order to test various strategies of assigning market value, a mathematical model of ILL transactions was designed and implemented as a FORTRAN program. While previous studies of mathematical modeling of ILL have been made[2], none has addressed the problem of load-leveling. The purpose of this section is to introduce the model and describe how it was used in selecting a market value strategy for the proposed NELINET ILL system.

THE MODEL

The central feature of the model is its simulation of ILL transactions. These transactions take place in a closed system of user defined "libraries." It is assumed that every item desired is held by a library in the system and is available for ILL.

Each library has three attributes: propensity to borrow (PROPTB), propensity to loan (PROPTL), and market value (MV). PROPTB defines how likely a library is to generate the next ILL request. PROPTL defines a library's value as an ILL resource, controlling the frequency with which a library will appear in the list of libraries holding items. Finally, MV is a system-computed factor assigned according to a library's activity. It influences the number of requests a library will receive.

The model must perform three tasks for each simulated transaction:

1. Designate the requesting library:
   For the purposes of the model, the requesting library is picked randomly, but each library does not have the same likelihood of borrowing an item. Therefore, the probability of a library being picked is weighted proportionally to its PROPTB.

2. Determine which libraries hold the desired item:
   The model must determine how many libraries hold the item. This is done using a pseudo-random number generator which reproduces the distribution of holders per item in the OCLC data base, as determined from the OCLC Cataloging File statistics. Then, a corresponding number of libraries are designated as holders. The probability of any library appearing on the list of holders is proportional to its PROPTL.

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2. Rouse, William, et al, *A Mathematical Model of the Illinois Inter-Library Loan Network Project Reports, Nos. 1-6.* Urbana, Illinois. Coordinated Science Laboratory, 1974-1976.

3. Choose the library which receives the request: When simulating a situation in which there is complete compliance with load-leveling, the system chooses the holding library with the highest market value. However, since it is not always desirable to assume complete compliance with the market value incentive strategy, a certain percentage of requests may be sent to any of the holding libraries without regard to their market values. Similarly, a certain percentage of requests may be sent completely randomly, in order to simulate the occurrence of blind searching.

APPLICATION OF THE MODEL TO THE PROPOSED NELINET SYSTEM

To test a market value strategy's effect on a given library environment, that environment must be represented for the model. Specifically, it must be decided how to assign PROPTB and PROPTL to each library in the system.

The model environment used by NELINET is based on statistics gathered by the NELINET ILL Base-Line Statistical Survey of selected libraries in New England (see Section II). Attributes of 90 libraries from those surveyed were assigned to libraries in the model.

Each library's PROPTB is defined so that it borrows the same number of items in each simulation month as it borrowed in the month of the survey. Thus, borrowing becomes a constant in the model, while the lender of the item may change.

Several definitions of PROPTL were considered. One possible definition of PROPTL would have been to base it on library size. This could be rationalized by inferring that the more items a library owns, the more likely it is to hold any particular item. But size is difficult to measure (should it include bound journals, manuscripts, microfilm, etc.). Also, not every item a library owns is available for interlibrary loan. It was decided that size alone is not a good measure of a library's value as an ILL resource.

Therefore, for NELINET's purposes, PROPTL is based on the number of loans reported by each library during the survey. Use of PROPTL does not make the number of loans by each library a constant, since more than one library is a potential lender for most items.

The strategy chosen has certain effects. It tends to make very large libraries appear overly valuable, since they now receive a disproportionately large number of ILL requests; similarly, libraries that did little or no lending during the survey may be more valuable than they

appear, since the lack of lending may have been due to poor availability of holdings information, or causes other than lack of resources. Moreover, it preserves the effects of fees: those who charged for ILL services did less lending, and so appear less valuable. A striking example of this is the Harvard College Library, which charges and lent half as many items as Massachusetts Institute of Technology, which does not charge.

The effect of these tendencies is to make it more difficult for any market value strategy to foster load-leveling. Thus, this environment provides a rigorous test of a market value strategy's load-leveling capabilities.

MARKET VALUE STRATEGIES

The goal of load-leveling is to have each library lend as many items as it borrows. While this is not completely possible (in view of special collections, etc.), it is possible to encourage librarians to send their ILL requests to those who do more borrowing than lending ("net borrowers"), and to avoid sending requests to "net lenders."* Therefore, the highest market values are assigned to net borrowers, making them more attractive in the ILL market place.

There are two essentially different approaches to the computation of market value: continual and batched. The first involves an adjustment of a library's market value after each transaction; the second involves waiting until a library has participated in some prescribed number of transactions before changing its market value. The basic idea behind both approaches is to look at recent activity, judge how far from the ideal the library's behavior has been, and adjust its market value toward where it should have been.

Continual adjustment is effected by increasing a library's market value each time it borrows, and decreasing it after each loan.

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* The measurement of interlibrary loans is a matter of some controversy, and the term "loans" must be used with care. The effort involved in processing any ILL request, whether it is filled or not, is considerable, and many ILL librarians feel that it is enough that all requests should count as loans. Others feel that an ILL system is only concerned with the transfer of materials, so only actual loans should count. Eventually, a policy decision on this issue will be made by the NELINET Committee on Interlibrary Communication.

The batched approach leaves a library's market value unchanged for some amount of time (or number of transactions), and then adjusts it based on this recent activity. As an example, suppose each library's market value was being adjusted after it had been involved in 100 transactions, and that in one such period some library had lent 61 items and borrowed 39. The excess lending indicates that this library's market value for the next transaction period should be lower, making it less attractive as a lender. Variations on this method fall into two classes: those that involve the assignment of the adjustment factor, and those that involve the time between recomputations ("transaction period").

NELINET tested the following implementations of these strategies using the model:

Strategy 1a: (continual) After each transaction, add 1 to the market value of the borrower, and subtract 1 from the market value of the lender.

Strategy 1b: (continual) After each transaction, divide the PROPTB of the borrower by 10 and add the quotient to the market value of the borrower; and divide the PROPTL of the lender by 10 and subtract the quotient from the market value of the lender.

Strategy 2: (batched) After a library has been involved in 100 ILL transactions, assign it a market value of $[(2M) + (B - L)] \div 3$, where M is the previous market value, B is the number of borrows in those transactions, and L is the number of loans.

EFFECTIVENESS OF STRATEGIES

Two criteria were used for measuring the effect of a market value strategy, one based on the reciprocity achieved for individual library performance, and one based on system-wide performance of reciprocity.

Individual Library Reciprocity

For an individual library, the amount of reciprocity can be gauged by looking at the ratio of loans to borrows. Ideally, this should be 1 to 1, so that distance from 1 represents how far a library is from perfect reciprocity.

In Chart I, the six libraries are representative of particular types of ILL behavior. There were remarkable similarities in the effects of these three strategies on the individual libraries.

CHART I

RATIO OF LOANS TO BORROWS, BY LIBRARY

Library	No Strategy	Strategy 1a	Strategy 1b	Strategy 2
A	1.95	1.39	1.36	1.24
B	0.10	0.21	0.58	0.68
C	2.54	1.37	1.46	1.51
D	0.11	0.92	0.80	0.64
E	0.17	0.66	0.65	0.73
F	19.57	16.57	8.14	--

1 = Ideal reciprocity (B = L)
Less than 1 = Net borrower (B > L)
More than 1 = Net lender (B < L)

A significant impact has been made. Library C is a heavy net lender with a large and famous collection, which receives and fills many ILL requests. The ideal would be for it to receive requests only when it is the sole holder of the desired item. This happened with strategy 1a and nearly happened with the others. Library D is a small library with little ILL volume, but a tendency to borrow more than it lends. Strategy 1a brought it very close to 1 (.92).

System-wide Reciprocity

System-wide reciprocity can be measured by the average of the absolute value of the difference between borrows and loans for each library. This is ideally zero. The difference of the factor from zero measures the inequality between borrowing and loaning which exists in the ILL system as a whole.

The system-wide reciprocity was also very close in the three strategies:

CHART II

AVERAGE OF DIFFERENCE BETWEEN BORROWS AND LOANS, SYSTEM-WIDE

No Strategy	Strategy 1a	Strategy 1b	Strategy 2
35.00	20.60	20.22	21.98

Strategy 1b achieved the lowest system-wide imbalance by a very small amount. None of the strategies brought the imbalance close to zero.

Random Factor

The above measurements of system-wide reciprocity were obtained in an environment which assumed that the holding library with the highest market value would always get the request. This is unlikely to happen, so these strategies were tried in several environments, wherein random holders were picked to receive requests anywhere from 5 to 25% of the time. At 25%, severe degeneration of the effectiveness of the market value strategy was seen:

CHART III

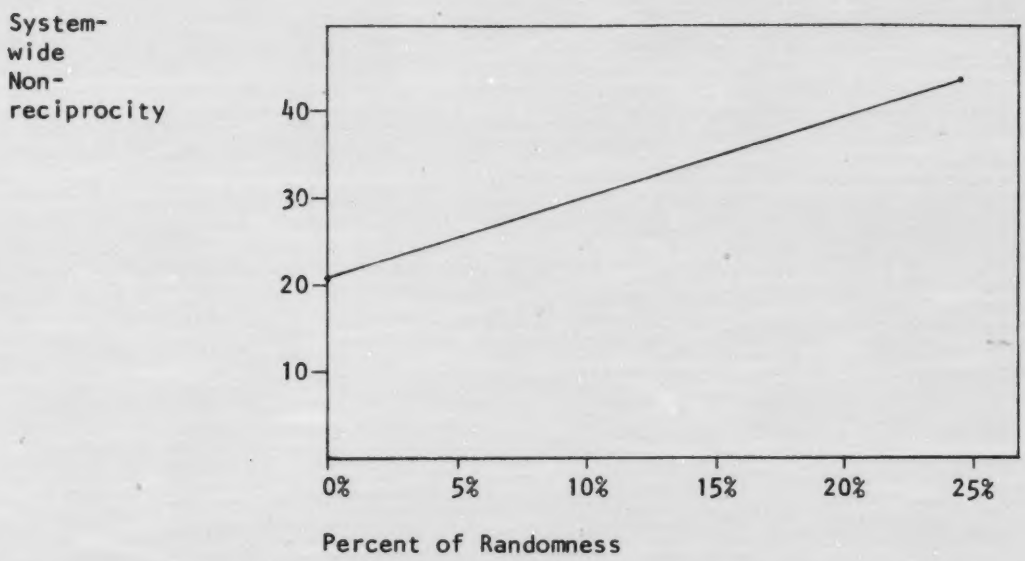
RATIO OF LOANS TO BORROWS, BY LIBRARY
(25% OF LOANS BY RANDOM HOLDING LIBRARY)

Library	No Strategy	Strategy 1a	Strategy 1b	Strategy 2
A	1.95	2.04	2.03	1.75
B	0.10	0.13	0.13	0.14
C	2.54	1.96	1.94	2.18
D	0.11	0.17	0.16	0.17
E	0.17	0.24	0.24	0.24
F	19.57	21.71	14.69	17.28

At 25%, very little load-leveling is being accomplished. In fact, the ratio of loans to borrows is further from 1 in some cases than it was under no strategy.

In terms of system-wide effects, a linear dependence between the amount of randomness in the system and the degradation of reciprocity was found as randomness was increased (see Chart IV).

CHART IV



At 25% randomness added into the system, the average of the absolute value of the difference between borrows and loans for each library rises to 40.

Evidently, the minimum value of the system-wide reciprocity factor is about 20 for this set of libraries. This is probably due in part to the large number of unique items shown by the OCLC catalog file statistics. According to their statistics, approximately 15% of the items in the data base are held by only one participating library. No control can be exercised over these items. Another cause is the inequality in the library collections represented in the model; that is, that some libraries have a much stronger propensity to loan than other libraries.

The results call the market value strategy into question. However, it cannot be concluded from this that a market value strategy will not foster load-leveling in an ILL system. There are no data available on how many times librarians will ignore the market value; perhaps 25% of the time is too high a guess. Also, it is likely that the character of the items requested via ILL differs substantially from the character of the OCLC data base. It is possible that for items with only one holder, the number that are requested via ILL is much smaller than the occurrence in the data base. This hypothesis is supported when one realizes that many ILL requests are for an item that a patron has seen cited, which makes that item a more attractive

addition to many collections. Further, the OCLC data base does not accurately represent holdings of serials, and serials form a large part of ILL traffic.

EVALUATION

The similarity of the results for each strategy indicates that the choice of market value strategy should be based on factors as discussed below, since their load-leveling capabilities are approximately equal.

Batched Approach (Strategy 2)

The batched approach presents two problems. For libraries that lend as many items as they borrow, this approach causes market value to shrink in absolute value; that is, all market values have a tendency to decrease. It would be preferable to have a strategy in which such libraries maintain a constant market value; then, these can be used as a yardstick to measure how far market values of libraries in flux should move.

The other problem with this strategy is the existence of stable points. Some libraries' market values hit a permanent equilibrium that is not a borrow/loan equilibrium. In general, such a stable point is not the ideal market value and no longer promotes load-leveling.

Continual Approach (Strategies 1a and 1b)

The continual approach presents different problems when used in conjunction with the model as defined for this research. As defined, propensity to loan (PROPTL) does not change from the propensity exhibited by libraries during the survey. A market value strategy should cause this value to change because present net lenders will move toward reciprocity and vice versa. In this application of the model, no way of achieving a dynamic PROPTL was discovered, but PROPTL may change drastically in a real library environment under the influence of the market value strategy.

In the model, some large libraries will always be net lenders because of the definition of their PROPTL as a constant factor. The market value of such a library continues to rise under this strategy, even after it has reached a point where it is receiving requests for items it alone holds. Similarly, the market value of a "chronic borrower" will fall. In these cases, the library's market value rank in relationship to other libraries in the system will not change, but the distance between its market value and that of closely ranked libraries will be constantly increasing. As a consequence, the market value of the library continues to grow until it becomes unmanageable. Moreover,

should a library's behavior change, even immensely, its market value would not be able to move far enough to change the rank.

However, it is possible to change the adjustment factors of such libraries so that their market values would stabilize, yet could still respond to changes in behavior. This could be done by manipulating the ratio between the factor added when a library borrows an item and the factor subtracted when it makes a loan, e.g., if the library lent three items for every two it borrowed, market value would be stabilized by adding 3/2 for every borrow and subtracting 1 for each loan. Even more simply, the market values of these libraries could be stabilized where they start to lend only unique items, since no further improvement in load-leveling can occur at this point. The difficulty is in deciding which libraries need this treatment and how often to revise it.

CONCLUSIONS

Each approach presents different problems and benefits. Further study is necessary before any conclusion can be reached about the load-leveling potential of the market value concept. It can have a significant effect under the proper conditions; what must be determined is the extent to which these conditions exist.

NELINET will continue to study this problem with the aid of a second grant from the United States Office of Education Library Research and Demonstration Project, which began on September 1, 1977. This new project will include a six month test of an actual computerized ILL system. The test will probably use the continual market value strategy 1b, which yielded the most satisfactory results when tested by the model, with the adjustments suggested above. This will provide data on the effects of the load-leveling strategy, especially in regard to the following questions:

- How often will the library with the highest market value be selected by users to receive ILL requests?
- How many items requested for ILL are unique within the region, as measured by the number of holders indicated by OCLC?
- How many items requested are not cataloged on OCLC?

Definitive answers to these questions will help NELINET decide whether the proper conditions for an automated ILL system with a market value module exist in New England, and can be used to help explore ways to make these conditions exist if they do not.

IV. A PLAN FOR INTEGRATING THE MARKET VALUE MODULE INTO THE ILL SYSTEM: DESCRIPTION OF THE PROPOSED SYSTEM

The market value module designed during this research will be implemented within the context of the ILL system to be developed in test mode under a grant from the U.S. Office of Education Library Research and Demonstration Program. The basic goals of the system are outlined in this section of the report, followed by a description of the services to be provided by the system and of the user interaction with these services in an on-line mode.

RESEARCH GOALS

There are four basic goals of the ILL system*:

1. Load-leveling. Some large libraries are currently bearing an unequal burden of ILL requests because of their rich resources, wide availability of holdings information about their collections, and the assumption by other libraries that they will be able to fill almost any request. The NELINET system should seek to alleviate this situation by monitoring system activity and identifying those libraries which are heavily impacted. The ideal goal is to create an ILL environment wherein every library lends as much as it borrows. While this is unlikely to ever be achieved in view of the inequalities which exist in library collections, the system should encourage libraries to move toward reciprocity.

2. Responsiveness. The major complaint made by patrons about ILL is the time it takes to find and procure a distant item. Any automated ILL system must have the improvement of patron service as a major goal. The major measure of improvement is reduction in time to fill ILL requests.

3. Regional Rationale. The local level is clearly the fastest and most convenient environment for ILL. The New England states already have developed ILL arrangements which successfully handle a large majority of requests. Many academic libraries have established cooperative lending policies with others near them. When requests cannot be filled locally, however, the next logical service parameter is the region.

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*These goals are four of the eleven Goals and Objectives identified by the NELINET Committee on Interlibrary Communication. This document is attached (Appendix E).

By providing cooperative access across state boundaries, an automated ILL system can increase the chances of procuring an item within a reasonable distance. The regional system does not seek to supersede or lessen the importance of state ILL systems and regional hierarchies, but merely to act as a facilitator in improving regional cooperation.

The regional system must also be aware of its place in the proposed national network. It is possible to maintain a load-leveling strategy only within some defined environment; such services fit best into the regional network. But the regional ILL system must operate within the national network and work toward the joint ends of enhancing service to the region and coordinating with the goals of the national network.

4. Service to all libraries. The NELINET system will be available to all libraries in the region, whether or not they participate in the other computerized services offered through NELINET, such as the OCLC on-line cataloging service. Load-leveling requires the participation of libraries of all sizes and levels of ILL activity, and the ILL system may be useful to libraries that would not find other kinds of services cost-effective.

   Providing access to the holdings of all libraries is a major but not insurmountable problem. Cost is a factor which could prevent some libraries from participating, but NELINET hopes to reduce cost of access by allowing libraries to use equipment that is within their budgets or to participate indirectly through access centers.

ILL SERVICES

The NELINET ILL system as proposed will provide the following types of information to users:

1. Market Value Data. The market value of each library will be a system-computed, flexible value which will reflect that library's ILL activity. The market value is based on the ratio of borrowing to loaning by each library. Libraries which are presently borrowing more than they lend will be assigned a high market value and libraries lending more than they borrow will be assigned a low market value. (See Section III of this report for a description of the way in which these values may be derived.) When a needed item is found in the data base, the system will automatically rank the holders of the item in order of their market value. The librarian has

the choice to send the request to the library with the highest market value or to choose another library if other factors make it more attractive.

2. Turnaround Time. Another type of data which can be monitored through an on-line system is the in-house processing time for each participating library. By keeping track of the lag between the time a request is sent to a library and when that library sends the item out, the turnaround time for each transaction can be computed. This information will be made available to the user to aid in the choice of potential lenders.

3. ILL Policy Data. Each participant will provide information about the library's ILL policies, which will be made available to all users as an on-line "Policy Manual." The policy information will include loaning restriction on types of materials or patrons, billing address, union catalog participation, etc. With this information, users will avoid sending requests that will have to be referred because of the library's lending policy.

4. Current Status Reports. The system will keep track of transactions and provide on-line reports to users on the status of all loans and borrows. The user can see in one display how many loan requests are still in process, how many borrowing requests have been filled by other libraries, etc. The system will also keep track of overdues, renewals and follow-up messages of all kinds.

5. Quarterly Activity Reports. Many libraries keep track of data about the use of ILL in the institution; which departments are borrowing heavily; what subject areas appear weak, or are in demand for loan; what types of institutions are borrowing; and the volume of activity in the ILL department. The system will have the capability to monitor system use and produce off-line usage reports about it to the library. Such capability should reduce or eliminate the need for manual files in the ILL department.

AUTOMATIC ILL

The services described above are those which have been defined by the CILC and the project staff as being helpful in ILL transactions. Each will be carefully tested and evaluated in test mode in order to weigh the costs of maintaining such enhancements against their value to the user. Feedback from users will determine whether all of these services are necessary in the automated ILL system.

It is proposed that these services be imbedded in the ILL procedure in the following way (user is identified as ILL librarian):

1. User searches data bases until bibliographic record for item is found. (Data base may include, but will not be limited to, OCLC data base.)

2. User requests ILL display for desired item.

3. System searches holdings codes on record, matching potential lenders against user's ILL profile. Each profile will describe the user's preferences in terms of a predetermined preferential borrowing group of libraries, geographic location of the user, market values of holding libraries, and turnaround times. These factors will be weighted according to user preference. The system will automatically pick the "best" choice according to the profile and will display to the user an ILL form assembling information from the bibliographic record and from the policy data of the chosen library.

4a. If the user decides not to borrow from the chosen library, a list of all holders, ranked according to the profile, can be requested.

4b. If the item is not in the data base, the user can call up a blank ILL form and fill in the appropriate information from any verified source (e.g., NUC).

5. The user adds whatever information is required to complete the request (e.g., title of periodical article, photocopying, date needed, etc.) and sends the request via the system to the chosen libraries.

6. Request is stored in chosen library's "mailbox" until that library checks the ILL file.

7. Chosen library responds to request. (Follow-up messages of various kinds will be possible.)

8. If first-choice library cannot fill request, the request will transfer automatically to the next library in line, unless the requesting library cancels this function.

9. When the request is complete and the item returned to the holding library, the system will cancel the workform, first stripping statistical information for record keeping purposes. For a detailed description of the data elements to be maintained on the system, see Appendix B.

SUMMARY

The proposed characteristics of the NELINET ILL system can be briefly listed as follows:

1. Direct communication with libraries in the system
2. A variety of on-line information
3. Individualized profiles
4. Access to multiple regional and national resources
5. Access to all types and sizes of libraries

These features have been developed by the Committee on Interlibrary Communication and the project staff, in order to address the service goals of the system. This brief description shows that the load-leveling module, as developed on the mathematical model of the ILL system, will be an integral component when the system is implemented in test mode.

V. EVALUATION - MARKET VALUE STRATEGY

The central purpose of the research undertaken at NELINET was to determine whether the market value strategy could effectively bring about load-leveling in a regional ILL system.

As discussed in Section III, the load-leveling strategies developed in the course of this research had significant impact on ILL traffic as represented by the mathematical model of the NELINET system. Although each algorithm had a somewhat different effect on the character of load-leveling, any of the three basic strategies could reasonably be implemented in the market value module within the operational ILL system.

However, the basic environment of the model assumes that the load-leveling strategy is conscientiously adopted by all users. When a percentage of random requests were made a part of the environment, the load-leveling capability degraded significantly. The following comments of participants in the demonstrations of the ILL system indicate that there are may variables which may work against choosing the highest market value even when their commitment to do so is quite strong:

1. "The idea (load-leveling) is important to consider but...most borrowing will be on a local or regional basis or in some cooperative arrangement, while only the difficult requests will become involved in the system."

2. "Encouraging load-leveling is important...(but)...market value information effectiveness will need a field test."

3. "I try to load-level requests I send out, and think it is a factor which makes your proposal attractive."

4. "...load-leveling is important and market value information would encourage such leveling, but location and charges of lending library would override for us."

5. "I feel that market value information could encourage load-leveling, but would the library collection of the non-NELINET members be in the data bank? If not, how can their collections be utilized?"

From these comments it is clear that the load-leveling strategy will affect a limited number of transactions where some other factors, such as geographic proximity, cost, existing delivery arrangements and state systems, do not dictate the choice of lending library. A preferred borrowing group which would automatically override all other holders as the user's first choice is a facet of the proposed ILL system which would serve to negate the load-leveling capability to some extent.

We have yet to address the problem of how the system will be accessed by libraries that lack OCLC computer terminals and how that access will affect the load-leveling that the system is intended to achieve. If the system is used by libraries whose holdings data do not appear in the data base, those that do appear will be heavily impacted. If the system is to work practically as well as technically, a way must be found to access holdings information for libraries not now in the OCLC data base. A union catalog survey showed few active union catalogs in New England. These are expensive to maintain and it is not likely that manual union cataloging activity will increase. Alternative means of access to holdings data must be found by increasing the number of New England libraries in the data base. If this is not done, reciprocity will be limited to NELINET member libraries and non-NELINET libraries will always be net borrowers, subject to whatever fees and penalties are imposed by the system.

Improving service will certainly increase demand and many smaller libraries are not equipped to handle any increase. The very concept of load-leveling is designed to shift the burden of ILL traffic to these smaller libraries. The increased pressure will either cause libraries to cut back on ILL or to increase staff, a Hobson's choice for administrators. NELINET will have to consider this problem if small libraries are to be convinced that the system will be of sufficient benefit to their patrons to justify the expense.

It can be conjectured that the market value module as proposed may not prove to be the most efficient way to encourage load-leveling in the system at the present time. Rather than rating all holding libraries for each transaction, matching the list against the user profile, and selecting the top choice for the user, it might be just as effective in the operational environment for the system to maintain the list of "overburdened libraries" who should be approached for a loan only when such a library is the sole holder of an item, or when a system-recognized cooperative relationship exists between that library and the requester.

It is possible that the environment provided by the mathematical model of the ILL system makes load-leveling easier to achieve than it will be in reality. It will be necessary to implement the market value module as a component of a fully operating system in order to realistically evaluate these problems.

The research undertaken during the past year has shown clearly that librarians are willing to support load-leveling to the best of their abilities. Whether or not NELINET's market value strategy encouraging load-leveling will be successful in a real ILL environment will be shown in the course of the next year's research.

VI. SUMMARY OF PROJECT TASKS

The five project results as defined in the proposal are listed below, with an evaluation of the way in which they were carried out.

1. Literature survey
2. ILL base-line statistical survey
3. Market value strategy demonstration package
4. Manipulation of bibliographic records from OCLC
5. A plan for integration of a market value module into a NELINET ILL system

LITERATURE SURVEY

1. *A summary of a literature survey of interlibrary loan costs and optimization techniques will have been produced. Special emphasis in the report will be placed upon literature dealing with machine-aided interlibrary loan systems.*

A field review of the literature of computerized ILL was carried out in the first months of the grant period and published in the second quarterly report of the project. The review discussed literature as it related to four objectives of the proposed ILL system:

1. Incentives for Reciprocity (load-leveling)
2. Improved Responsiveness
3. Regional Rationale for Resource Sharing
4. The Multi-Type Library Network

It was concluded from the review that systems for load-leveling have been inadequately explored in the literature. The NELINET research and demonstration project may help to provide needed information on this problem. Those citations which do refer to load-leveling report a positive attitude toward the concept, along with a wide documentation of existing inequalities in the ILL burden.

The literature strongly supports the concept that computer communications can improve the speed of ILL transactions, but one of the most widely noted problems in improving responsiveness is the necessity for union catalog access and improved delivery of materials. This will be addressed by further research during the implementation phase of the NELINET ILL system.

The concept of regionalism assumes that New England could fill its interlibrary loan needs within the region if full access to regional resources were available. Regional nodes have been proposed as part of the design of the national network. NELINET must continue to explore the role of the regional network in the development of a national library network in order to improve service to the region and cooperate in the goal of improving national service.

The literature shows that multi-type networks can be successful, especially if flexible enough to allow a direct link to the network via a number of modes of access (TWX, terminal, phone, etc.). A number of sophisticated ILL systems already exist within New England in the academic, public, and private sectors. Each of these has a valuable contribution to make in terms of resources, and each can benefit from access to another.

One of the most important problems revealed by the literature search is the necessity to provide wide access to holdings information. In order to be successful, the NELINET ILL system will have to examine the possibilities of promoting access to resources beyond such existing tools as the OCLC data base. This problem will be part of the research portions of the implementation phase of the ILL project.

The review did not deal with ILL costs in any comprehensive fashion. This is a major lack which will also be addressed during the next project year by a cost appraisal study. Except for the work on the OCLC ILL system, however, there appears to be no other project in progress at the present time which is actively engaged in developing a computerized ILL system. The literature review was useful as a means to:

1. provide needed background and context for NELINET's research project

2. determine that NELINET was not duplicating any other projects and will be breaking new ground

3. describe what previous research is of value in carrying out and evaluating the ILL project

Of all the basic tasks of the projects, however, the review was the least directly concerned with the development of the market value strategy and the design of the ILL system.

ILL BASE-LINE STATISTICAL SURVEY

2. *A report of a pre-impact survey of a sample of NELINET member institutions will have been produced. This survey will contain analyses of historical data about interlibrary traffic loads, turnaround times, routes taken by messages and materials and referrals. A summary of current interlibrary loan policies will also be contained in the report. These data will be available for comparison with the effects of the fully operational system after the first year, if the project is completed.*

A preliminary report of the survey was published in the third quarterly report of the project. A final version, with expanded analysis and graphic presentation, is found in Section II of this final report.

The survey was of great value in carrying out the project. Survey data were integrated in the development of the model of the NELINET ILL system (see Section III). As the project continues, the data gathered and analyzed over the past year will be very useful, both as a base against which to measure the effectiveness of on-line communication of ILL transactions and in evaluating the success of the load-leveling strategy in improving ILL service in New England.

The software used to manipulate and analyze the statistical data gathered in the survey will be used within the operational system to gather parallel statistics.

The survey had certain design problems. A section of the survey which was intended to show subject areas of loaned items lacked a designation for fiction, so participants categorized fiction in different ways. Thus, the subject information was difficult to reduce and is not part of the survey analysis. As many of the libraries participating in the survey lacked NUC symbols, it would have been preferable to merely note states to which requests were sent, rather than specific libraries. It was impossible to gather statistics on the flow of ILL traffic among different sizes of libraries, because of the survey design. The survey intentionally did not deal with the variable of serials and photocopying, as these factors do not effect the concept of load-leveling.

A serious deficiency of the survey sample was its size. Only 113 usable survey forms were returned (58% of total) making it dangerous to draw generalizations about all of New England from the data. However, as the sample included more then 50% of all NELINET participating libraries, it is a fairly accurate picture of that population. The additional data about non-members give important information on the total ILL picture in New England.

DEMONSTRATION OF MARKET VALUE STRATEGY

3. *A multi-terminal, network-oriented system will have been constructed for two purposes: (a) to serve as a laboratory tool for the project staff and the Committee on Interlibrary Communication to help design the "Market Value" demonstration, and (b) to demonstrate the utility incentives inherent in the approach by means of hands-on demonstrations, as well as to demonstrate the integrated system. Such demonstrations will have been made to the U.S. Office of Education.*

This task was the primary activity of the project. It took place in two ways:

1. the design of a demonstration package which simulates typical ILL transactions using the market value module in an on-line environment

2. the development of a mathematical model capable of predicting the effectiveness of market value strategies in promoting load-leveling of ILL traffic in New England

In its final form, the demonstration package comprised representative screen displays of the information to be provided to users of the system, and a simulation of typical interactive sequences of ILL messages and transactions as they might be transmitted via the system. These displays were part of a presentation about the system made to a representative of the U.S. Office of Education at NELINET in April, 1977 (see Appendix A for screen displays).

It had been anticipated by project staff that the NELINET Communications Processor would be operational by summer 1977, and that the demonstration package would be further enhanced to include the display of on-line message transmittal capability. Equipment malfunction, staff turnover, and unforeseen problems in software implementation and debugging made this refinement of the demonstration package impossible during the first year of the project. An off-line version of the demonstration package was used in the dissemination of information on the project.

The project proposal states that the demonstration package would be used in the evaluation of the market value strategy. Although this was done in terms of evaluating user reaction to the concept of deliberate load-leveling, it was soon determined that an attempt to demonstrate the actual load-leveling capabilities of any particular market value strategy by means of a hands-on session would have involved a much larger number of participants, terminals, and simulated transactions than could be reasonably handled in the

proposed two-day session. For these reasons, a mathematical model which could test many load-leveling strategies was designed and implemented at NELINET. The model proved to be a more flexible, accurate, and convincing demonstration of the potential of the market value strategy than had been anticipated. See Section II for a full description and evaluation of the model.

The software designed and implemented in the development of the mathematical model to handle market value algorithms will be used when the load-leveling module is integrated into the operational ILL system. However, not all software scheduled for completion during the first year of the project was actually implemented because of the inability to add user interface to the ILL system demonstration package.

The uncompleted software can be described schematically:

The lack of a user interface package means that the market value module will need further software implementation before being integrated into the ILL system. However, the major elements of the module have been developed and have served the design function for which they were primarily intended.

MANIPULATION OF OCLC RECORDS

4. *Bibliographic records from the OCLC data base will have been manipulated in both the design and demonstration phases of the project.*

OCLC bibliographic records, as prototypical of the type of MARC displays which will be available to users through the system, served as a basis for the design of a number of displays in the demonstration package. As noted in Appendix B of this report, which describes the data and functional requirements of the proposed NELINET ILL system, a typical ILL transaction will draw a large percentage of bibliographic data from the OCLC record.

The demonstration package simulates the system manipulation of holdings information from an OCLC record to determine the most attractive borrower. In addition, the mathematical model derived a distribution curve for the number of holders per record from the CATF STATS (catalog-file statistics) generated by the OCLC system (see Section III). OCLC records were not manipulated in an interactive environment because of the delays in software production.

INTEGRATION OF MARKET VALUE STRATEGY

5. *If the demonstration proves effective and workable from the point of view of both the user, as represented by the Committee on Interlibrary Communication, and the system economics, a plan for integrating the market value module into a fully operational ILL system will be devised.*

As discussed above, the effectiveness of the market value strategy can be fully evaluated only in the context of a working ILL system. Therefore, NELINET has presented a proposal to the Office of Education to fund another year of this demonstration project to bring about the implementation of a working ILL system in test mode. This proposal has been accepted and work has already begun on the implementation phase.

Section IV of this report presents a plan for implementing the market value module as part of the ILL system, and an overview of the way in which the module might work with a fully operational system.

VII. DISSEMINATION OF INFORMATION

As stipulated in the grant proposal to the Office of Education, dissemination of information about the project has taken place in two ways:

1. through news releases and articles in the professional library literature

2. through demonstration and presentations about the system to various groups within the library community

A news relase about the system was issued to the New England state library newsletters in November, 1976. Peter Oliver, Librarian of Andover-Harvard Divinity School and member of CILC, published a letter in Library Journal about the ILL system in January, 1977. A brief article appeared in Channel in May, 1977 and in the Advanced Technology Library Newsletter in September, 1977. In addition, articles have been submitted to professional journals which describe the results of the ILL base-line statistical survey and mathematical model used to test load-leveling strategies. These articles should be appearing in the coming year.

The major thrust of dissemination of information was directed toward arranging informal, small seminars with staff of the state library agency and other interested persons in each of the New England states during July and August, 1977. The primary reasons for holding these seminars were:

1. to demonstrate the concept of the load-leveling strategy

2. to elicit reactions to the strategy, suggestions for enhancement of the system, and problem areas which might be encountered

3. to publicize the research being done under the grant

The CILC determined that these small meetings would allow participants to evaluate the proposed system and discuss its utility in a local (i.e., state) context. The responses of attendees at these meetings have been integrated into the evaluation of the market value concept.

Another forum for presentation and discussion of the ILL system was the NELINET Annual Meeting in April, 1977. The characteristics of the proposed system were demonstrated to the directors of NELINET libraries. In September, 1977, a similar presentation was made at the annual conference of the New England Library Association to representatives from libraries throughout the region. A staff representative also spoke on a panel on resource sharing at the same conference.

In October, 1978, David Ferriero, Humanities Librarian at MIT and CILC member, will present a paper on the NELINET ILL system at the annual ACRL conference. Members of the CILC have also been active in their own states in making information about the system available.

The quarterly reports to the Office of Education have been distributed to all members of the NELINET Executive Committee and to representatives of the Council on Computerized Library Networks, which includes the major regional networks. Copies have also been distributed to a mailing list of about 25 interested librarians throughout the country. It is expected that the Office of Education will submit this report to ERIC for access purposes.

VIII. CONCLUSIONS

Any attempt to bring together final conclusions about an entire year of research must necessarily present only the main points. This final section will briefly review the most important evaluations made throughout the report as a summary of the project.

A philosophical commitment to load-leveling does exist among New England librarians to whom the concept was presented. However, research has revealed that the effectiveness of the market value strategy for load-leveling is subject to a number of factors which control ILL traffic. The mathematical model showed that the load-leveling strategy ceases to be effective when the highest market value is chosen less than 75% of the time. The usefulness of the load-leveling strategy must therefore be carefully examined. It will be a costly enhancement if it can have only a small improvement on the reciprocity in the system. During the next year of research, when a test system is available for testing the strategy in a real library environment, better evaluation can be made of the usefulness of the strategy and of alternative strategies for load-leveling.

Librarians to whom the system was demonstrated felt that quick access to information about turnaround time and ILL policies of participating libraries was the strongest feature of the automated system. Therefore, these will definitely be included in the NELINET ILL system in order to assist librarians in making intelligent choices about potential lenders. This information will also allow NELINET to keep accurate statistics about the speed of ILL traffic via the system.

Some suggestions for continuing research on the development of automated ILL can be made from the knowledge gained by this year's project. Future research must be aimed toward providing means for the participation of New England libraries not presently using the OCLC on-line cataloging system. Load-leveling depends on a wide range of participants, as does the goal of filling as many requests as possible within the region.

Libraries are unlikely to search off-line or manual lists when they can find a needed item in the data base, even when that item is outside the New England region. Therefore, a primary recommendation resulting from this research is that a regional register of locations be developed as an aid to regional ILL. Only with such an access tool can the ILL system begin to serve all New England libraries which might benefit from access to an automated ILL system. This concept is consistent with the goal specified in Year II of this project: providing access to all types and sizes of libraries.

This year of research has revealed both strengths and weaknesses in the NELINET ILL system and load-leveling strategy as first envisioned. It has also pointed the way toward further research and services which must be developed in order to make automated ILL a valuable service for libraries in New England.

MARKET VALUE STRATEGY

A series of screen displays have been developed to demonstrate the way in which a market value strategy might be presented to users.

Two elements of information which could be provided through the system are (1) market value and (2) turnaround time.

1. Market value is a system-assigned numerical credit or debit for each library in the system based on the interlibrary loan performance of that library.

2. Turnaround time is the average length of in-house time which the institution takes to fill a request.

Please note that the figures for market value and turnaround time on the following screens are intended for illustrative purposes, and do not necessarily represent a given library's performance. The demonstration is designed to illustrate the ways in which information provided by the system could be utilized to help the borrowing library choose the lender providing the best ILL service.

The transaction begins by finding the item in question in a data base. In this case, the item is found in the OCLC data base (see Display I). Requesting a market value display produces a listing of holding libraries, in New England only, according to their standing in market value (see Display II). Libraries with a high market value are net borrowers from whom it would be desirable to borrow in order to promote load-leveling.

It might also be possible to request a list of the same libraries ranked by turnaround times.

The next display (Display III) shows a ranking of the institutions according to an equation which weights turnaround time and market value evenly. Note that Boston University School of Theology, with better turnaround time than University of Vermont, has moved to the top of the list, while University of Vermont has fallen to fourth despite its high market value.

A variation on this ranking is shown in Display IV, where market value is weighted twice as much as turnaround time. This has resulted in University of Vermont being ranked second. Such variances in weighting of the holding libraries would be established for each borrowing library on the system as part of their ILL profile.

ILL POLICY DATA

Each library in the system will supply information about its lending policies, fees, union catalog participation, etc., to aid libraries which wish to borrow from it. Information about billing and mailing addresses will be drawn automatically from this file when an ILL request is formatted. Displays V and VI are examples of policy screens.

DISPLAY I

```
 Screen 1 of 2
 OCLC: 1341590      Rec stat: p Entrd: 750424        Used: 771027
Type: a Bib lvl: m Govt pub:   Lang:  eng Source:   Illus: a
 Repr:   Enc lvl:   Conf pub: 0 Ctry:  nju Dat tp: s M/F/B: 00
 Indx: 1 Mod rec:   Festschr: 0 Cont: b
 Desc: i Int lvl:   Dates: 1975,
  1 010     75-14211
  2 040     DLC c DLC
  3 020     047020950X
  4 050 0   BJ1012 b .M63
  5 082     170
  6 090      b
  7 049     OCLC
  8 245 00  Moral development : b current theory and research / c edited by
David J. DePalma, Jeanne M. Foley.
  9 260 0   Hillsdale, N.J. : b L. Erlbaum Associates ; a New York : b
distributed by Halsted Press, c 1975.
 10 300     viii, 206 p. : b ill. ; c 24 cm.
 11 490 0   Child psychology
 12 504     Includes bibliographies and indexes.
 13 650  0  Ethics.
 14 700 10  DePalma, David J.
 15 700 10  Foley, Jeanne M.

 Screen 2 of 2
OUN KSU WSU BGU TOL CSU CWR BLC DAY CMJ OSU MIA STU MSC AKR ANC KEN ATO MAL OBE
WMC WOO XAV YNG DRB PAU TEU WEL RIU TFW YDS BBH VTU NHM FSM BDS RRR BUF BNG COO
BXM SYB BZM BPS DLM SJD NAM HRM OHI CKM INT ITD ISM SRS SNN IWU WHE IUA IAU IEA
IHS IXA MTH IQU IRU AMH SPI MYG SOI IPU YWH YPM ZLM ZGM XFM RBN YSM HLS RVC YGM
WTU ZBM XBM YTM GSU GAT PUL YCM WLU EMU YAH MUB JHE YBM GZW GUA ZRS GGC ZVM GYG
```

DISPLAY II

#1341590
Moral development: current theory and research / ed. by David J. Depalma, Jeanne M. Foley.
Hillsdale, N.J., L. Erlbaum, 1975.

MRKT	WAIT	INST	
6.2	13.0	VTU	University of Vermont
5.8	8.2	BZM	Boston University, School of Theology
2.3	6.0	MTH	Mount Holyoke College
2.2	10.0	HRM	University of Hartford
2.2	7.0	WEL	Wellesley College
2.0	13.0	URI	University of Rhode Island
1.7	9.0	BXM	Boston College
-2.8	13.1	*YUS	Yale University (6.00)
-4.9	9.6	MYG	Mass. Institute of Technology
-5.0	8.0	BOS	Boston University
-5.4	7.0	*DRB	Dartmouth College (4.00)

DISPLAY III

#1341590
Moral development: current theory and research / ed. by David J. Depalma, Jeanne M. Foley.
Hillsdale, N.J., L. Erlbaum, 1975.

M/W	MRKT	WAIT	INST	
7.6	5.8	8.2	BZM	Boston University, School of Theology
6.3	2.3	6.0	MTH	Mount Holyoke College
5.2	2.2	7.0	WEL	Wellesley College
3.2	6.2	13.0	VTU	University of Vermont
2.7	1.7	9.0	BXM	Boston College
2.2	2.2	10.0	HRM	University of Hartford
-1.0	2.0	13.0	URI	University of Rhode Island
-2.4	-5.4	7.0	*DRB	Dartmouth College (4.00)
-3.0	-5.0	8.0	BOS	Boston University
-4.5	-4.9	9.6	MYG	Mass. Institute of Technology
-5.9	-2.8	13.1	*YUS	Yale University (6.00)

$$X = M + (10 - W)$$

Asterisk indicates that fee is charged for lending.

DISPLAY IV

#1341590
Moral development: current theory and research / ed. by David J. Deralma, Jeanne M. Foley.
Hillsdale, N.J., L. Erlbaum, 1975.

M/W	MRKT	WAIT	INST	
13.4	5.8	8.2	BZM	Boston University, School of Theology
9.4	6.2	13.0	VTU	University of Vermont
8.6	2.3	6.0	MTH	Mount Holyoke College
7.4	2.2	7.0	WEL	Wellesley College
4.4	2.2	10.0	HRM	University of Hartford
3.4	1.7	9.0	BXM	Boston College
1.0	2.0	13.0	URI	University of Rhode Island
-7.8	-5.4	7.0	*DRB	Dartmouth College (4.00)
-8.0	-5.0	8.0	BOS	Boston University
-8.7	-2.8	13.1	*YUS	Yale University (6.00)
-9.4	-4.9	9.6	MYG	Mass. Institute of Technology

$$X = 2M + (10 - W)$$

DISPLAY V

University of New Hampshire
Dimond Library

NUC: NhU
OCLC: NHM

Interlibrary Loans
University of New Hampshire
Dimond Library Durham, NH 03867

TWX :510-297-4441
PHONE : 603-862-1173

STATUS REPORT: 2 weeks

VIA: TWX, Mail

HOLDINGS LISTED: NST,ULS, OCLC,NUC, Consortium listing (NHCUC)

WILL LOAN:

Books	- 4 wks, renewable
Periodicals	- 2 wks, no renewal
Gov. docs.	- 4 wks
Microforms	- 2 wks, no renewal
Genealogical	- 4 wks (if catalogued)
Technical reports	- 4 wks (if catalogued)
Sheet music	- 4 wks (if catalogued)

BILLING: Invoice with shipment
COMMENTS: Contact media department for A-V materials.
DEPOSITORY: ERIC, U.S. Documents, Canadian Documents.

DISPLAY VI

Massachusetts Institute of Technology
MIT Libraries

NUC: MCM
OCLC: MYG

Interlibrary Loan
MIT Libraries
Cambridge, MA 02139

TWX: none
Phone: 617-253-5682

STATUS REPORT: Within two days

VIA: Mail

HOLDINGS IN: NST, ULS, NUC, OCLC, CASSI, Boston Library Consortium List

WILL LOAN: Books - 10 days, renewable once
Technical reports - 10 days, paper copy only
Government docs. - 10 days, not renewable

BILLING: No charge to non-profit libraries
$5.00 per title to libraries of profit making organizations
COMMENTS: No A-V available for loan
SHIPPING: U.S. Mail - Library Rate
DEPOSITORY: ERDA, NTIS, U.S. Government Documents (Selective)

DATA REQUIREMENTS

These data requirements were identified by the Committee on Inter-library Communication (CILC) and then discussed in terms of the functional requirements of the system to make sure that no necessary elements had been omitted. They are described in the sequence in which they are encountered by the user.

1. The following data elements, if applicable, will usually be drawn from the data base record, and will automatically appear when an ILL form is requested for a particular item. Any of these data can be input at the terminal by an operator when an item is not located in an on-line data base.

   Author
   Date of Publication
   Title
   Place of Publication
   Publisher
   Edition
   LC card number
   Superintendent of Documents number
   Classification number
   Type of item (i.e., mono., serial, A-V)
   ISSN/ISBN
   Location verification source
   Bibliographic verification source

2. The following data elements will be added to the ILL form by the user at the point of transmittal.

   Generic request (similar item will be accepted)
   *Title of article
   *Author
   *Volume and date
   *Pages
   Subject designation
   Department or section of library making request
   Date needed (deadline for material usability)
   Patron status (in-house only)

   *If serial item

3. The following information would be automatically derived from NELINET ILL system files.

   Fee charged
   Shipping address
   Billing address
   Applicable policy statement of loaner

4. The loaning library will supply the following data.

   Date shipped
   Date due

5. The market value module will retain and supply the following data for each participant.

   Market value status
   Turnaround time
   Primary borrowing group
   Automatic profile

6. The ILL system will provide the following data on demand for each library.

   Loan requests received (time period to be determined)
   Loan requests filled
   Status of all loan requests
   Borrow requests made
   Borrow requests filled
   Borrow requests overdue
   Borrow requests referred

Each library will define which of these data elements are required by its ILL procedures. The system is designed to eliminate the necessity for ILL departments to maintain manual files.

7. Some data may also be collected and provided in an off-line mode by the system.

   Journal title photocopying use tally (for copyright compliance)
   Type of material being loaned (subject, format)
   Type of material being borrowed (subject, format)
   Types of libraries serviced
   In-house processing time
   Type of patron served

These elements will be very precisely defined. Statistical reports will depend on the accuracy of data elements. Additional statistical data will also be gathered for NELINET information and for comparison with the data gathered in the base-line statistical survey:

   State-to-state traffic
   In-state traffic
   ILL outside New England
   Type of libraries in each transaction
   Size of libraries in each transaction
   System-wide turnaround time
   System-wide fill rates

With such data available, it is expected that NELINET can analyze ILL flow more completely and accurately than has previously been possible by manual means. It is expected that these data will be helpful in determining the effectiveness of the market value strategy in promoting load-leveling.

NELINET COMMITTEE ON INTERLIBRARY COMMUNICATION

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Roger Williams College

	SEPTEMBER 1976	OCTOBER 1976	NOVEMBER 1976	DECEMBER 1976	JANUARY 1977	FEBRUARY 1977	MARCH 1977	APRIL 1977	MAY 1977	JUNE 1977	JULY 1977	AUGUST 1977	SEPTEMBER 1977	OCTOBER 1977
Task 1-1 RA hired.	X													
Task 1-2 RA meets with the PI and PD to define scope of the Field Review including sources to be scanned, people to be contacted and formats for a summary report.	X													
Task 1-3 RA meets with the CILC to review and obtain comments upon the preliminary search results of the Field Review.		X												
Task 1-4 RA completes Field Review and presents oral report to CILC. Progress reported in First Quarterly Report to the U.S.O.E.			X											
Task 1-5 Written summary of Field Review completed and appended to Second Quarterly Report to the U.S.O.E.						X								
Task 2-1 Same as 1-2, hire RA.	X													
Task 2-2 RA meets with PI and PD to define scope and format of Pre-Impact Data Gathering efforts and integration with Field Review. Sample institutions selected.	X													
Task 2-3 RA meets with CILC to review and obtain comments upon the preliminary work. Progress reported in First Quarterly Report.			X											
Task 2-4 Data collected by means of questionnaire and interview.					X									
Task 2-5 Progress reported in Second Quarterly Report.						X								
Task 2-6 Preliminary reported prepared for review by PI, PD, and CILC.							X							

	SEPTEMBER 1976	OCTOBER 1976	NOVEMBER 1976	DECEMBER 1976	JANUARY 1977	FEBRUARY 1977	MARCH 1977	APRIL 1977	MAY 1977	JUNE 1977	JULY 1977	AUGUST 1977	SEPTEMBER 1977	OCTOBER 1977
Task 2-7 Final draft prepared and distributed to CILC by RA.								X						
Task 2-8 Final report of Pre-Impact Data completed. Reported in Third Quarterly Report to U.S.O.E.									X		Survey analysis reviewed and evaluated in Final Report			
Task 3-1 The PD and SA will draft a series of test screen displays which simulate a typical sequence of interactions with the Commodity Market Incentive Demonstration (COMID).			FOR COMPLETION DATES OF TASKS IN NUMBER 3, PLEASE SEE REVISED TASK 3											
Task 3-2 After staff review and refinement, the screen displays will be coupled with a preliminary instruction manual for comment by the CILC at their first project-supported meeting.														
Task 3-3 After refinement, pre-coding specifications will be worked out and software production will commence.														
Task 3-4 Progress reported in the First Quarterly Report.														
Task 3-5 Software production and debugging continues with preliminary demonstration.														
Task 3-6 Progress reported in Second Quarterly Report.														
Task 3-7 First hands-on demonstration of COMID; U.S.O.E. representatives invited to participate.														
Task 3-8 Demonstration refined and tested with demonstration of bibliographic data base supplied by OCLC.														
Task 3-9 Descriptive documentation begun and reported in Third Quarterly Report.														

	SEPTEMBER 1976	OCTOBER 1976	NOVEMBER 1976	DECEMBER 1976	JANUARY 1977	FEBRUARY 1977	MARCH 1977	APRIL 1977	MAY 1977	JUNE 1977	JULY 1977	AUGUST 1977	SEPTEMBER 1977	OCTOBER 1977
Task 3-10 CILC begins formal evaluation of hands-on system and writing results incorporating research questions.			FOR COMPLETION DATES OF TASKS IN NUMBER 3 PLEASE SEE REVISED TASK 3											
Task 3-11 Analysis of demonstration by staff.														
Task 3-12 Compilation of results and report writing														
Task 3-13 Final Report submitted														
Revised Task 3, showing refinements made during development of the market value module														
Task 3-1r The PD and SA will draft test screen displays which simulate a typical sequence of interaction with the market value module.		X												
Task 3-2r Staff refinement; comment by CILC.		X												
Task 3-3r Pre-coding specifications developed.			X											
Task 3-4r Progress reported--First Quarterly Report			X											
Task 3-5r Profile display drafted				X										
Task 3-6r Comment by CILC and refinement of all displays					X									
Task 3-7r Progress reported--Second Quarterly Report.						X								
Task 3-8r Descriptive documentation of data element.							X							
Task 3-9r Presentation of market value concept and ILL system to NELINET directors.								X						

	SEPTEMBER 1976	OCTOBER 1976	NOVEMBER 1976	DECEMBER 1976	JANUARY 1977	FEBRUARY 1977	MARCH 1977	APRIL 1977	MAY 1977	JUNE 1977	JULY 1977	AUGUST 1977	SEPTEMBER 1977	OCTOBER 1977
Task 3-10r Presentation to Office of Education representative.								X						
Task 3-11r Market value model designed.									X					
Task 3-12r Progress reported--Third Quarterly Report									X					
Task 3-13r Market value model programmed										X				
Task 3-14r Preliminary descriptive documentation of functional elements.										X				
Task 3-15r Comment and evaluation by CILC.										X				
Task 3-16r Market value strategies tested on model.										X---	X			
Task 3-17r Presentation made to state library agencies											X---	X		
Task 3-18r Final evaluation by CILC and staff											X---	X		
Task 3-19r Presentation at NELA													X	
Task 3-20r Input to Final Report													X---	X
Task 4-1 Four trips by the PI and PD have been planned with project support to accomplish the following four objectives: (a) to brief the OCLC Research and Development staff on the scope and progress of the demonstration,	X													
Task 4-2 (b) to elicit their comments about both the design and implementation of the demonstration, (c) to plan for the integration of the demonstration model into an operating ILL module, and				X										

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Task 4-3 (d) to negotiate the terms, procedures and schedule within which the demonstration data base (see below) will be made available to the project.							X				These tasks were eliminated when focus of demonstration was turned to mathematical model			
Task 4-4 Approximately 100 bibliographic records will be obtained from OCLC either by on-line transmission or on magnetic tape. These records will be used by NEBHE/NELINET as a demonstration data base to develop, test and refine the "Commodity Market" interlibrary loan incentive model.					X									
Task 4-5 OCLC Research and Development staff invited to use the demonstration system.							X	------	------	X	No visit was made. OCLC staff will visit NELINET 10/77			
Task 5-1 Planning and Evaluation meeting of the CILC.		X									Seven grant supported meetings were held.			
Task 5-2 Planning and Evaluation meeting. Progress reported in First Quarterly Report.			X											
Task 5-3 Progress Evaluation meeting.					X									
Task 5-4 Progress Evaluation meeting. Progress reported in Second Quarterly Report.						X								
Task 5-5 Progress Evaluation meeting.							X							
Task 5-6 Hands-on evaluation session.								X						
Task 5-7 Hands-on evaluation session. Progress reported in Third Quarterly Report.									X					
Task 5-8 Input to Final Report.										X				
Task 5-9 Review of Final Report.												X→		

	SEPTEMBER 1976	OCTOBER 1976	NOVEMBER 1976	DECEMBER 1976	JANUARY 1977	FEBRUARY 1977	MARCH 1977	APRIL 1977	MAY 1977	JUNE 1977	JULY 1977	AUGUST 1977	SEPTEMBER 1977	OCTOBER 1977
Task 6-1 First Quarterly Report.			X											
Task 6-2 Second Quarterly Report						X								
Task 6-3 Third Quarterly Report									X					
Task 6-4 Final Report												X		

SERVICE GOALS AND OBJECTIVES OF THE INTERLIBRARY LOAN SUBSYSTEM

INTRODUCTION

The Executive Committee of the New England Library Information Network (NELINET) has authorized the research, design and implementation of a NELINET interlibrary communications system. Toward that end, it has created a Committee on Interlibrary Communication (CILC) whose membership is broadly representative of management and public service personnel from a variety of types of libraries throughout New England.

The New England Board of Higher Education (NEBHE) received a grant from the United States Office of Education for the first year of a two-year project, which provides support to the NELINET program and the CILC to undertake research and demonstration activities which underpin the development of the NELINET Interlibrary Communications System. This system will be open to all New England libraries.

The first component is the interlibrary loan module. Using the OCLC data base and other resources it will allow interlibrary loan messages to be transmitted via terminals from one New England library to another. Certain management records, as well as other information, will be kept automatically in the NELINET computer facility for display to ILL librarians, directors and network managers.

The Service Goals and Objectives have been developed by the CILC. Comments from the NELINET membership and others have been incorporated into the current version. The Committee expressly cautions readers that this document is not finished: it is dynamic and merely sets down the latest thinking of the Committee. Comments, amendments and criticisms are solicited as a practical way to develop the service with maximum input from the poeple upon whom the system will have impact.

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ILL GOALS AND OBJECTIVES

Revised January 18, 1977

1. The system must provide ILL librarians with the ability to request and supply library materials to local users from libraries in New England, either in original form or in duplicated form.

   Materials should be available from libraries within the terms of agreements among the participating institutions. The CILC should develop model agreements for this purpose.

2. The system must provide and encourage reciprocity (i.e., equalization of borrowing and lending activities among participants).

   The inequity of interlibrary loan demand has been an area of complaint among large net-lending libraries. Their lament, and it is not unfounded, is that they are asked to fill large numbers of requests that are submitted primarily on the strength of the opinion that they "have everything." Of course this is not the case, and many loan needs could in fact be filled most expeditiously from smaller libraries closer to home with specialized collections which often go unrecognized as a resource.

   A machine-based loan system, utilizing a data base or bases containing the holdings of the libraries of New England could do much to alleviate or even solve many of the inequities of interlibrary loans. It has already been reported that the presence of holding statements in the OCLC records is resulting in increased utilization of smaller libraries for interlibrary loan. Any NELINET interlibrary loan system should be constructed to encourage a more equal sharing of resources in New England.

   There are two obvious ways in which this might be accomplished. The ILL system could rank libraries by net ILL activity (borrowing and lending) and forward requests to the least-imposed-upon library which holds an item. As another option, the system could apply differential charges for loans to discourage borrowing from libraries which are heavy lenders. This latter could work in either an automatic or semiautomatic mode, permitting the borrower to choose which lender to utilize while being cognizant of the differential.

   One point which would have to be determined is whether there should be a policy whereby a library can charge a different rate for unique items.

3. The scope of the system must be broad enough to serve the information needs of all libraries in New England and between New England libraries and others outside of New England.

   The NELINET Interlibrary Loan System must provide service to all library patrons in all New England libraries. Requests for materials must be filled without regard to size, location or type of library, reason for request, or status of the user.

   All New England libraries should be permitted access to the data base either directly on-line or indirectly. Libraries on-line should be encouraged to extend this access to those without a terminal, via telephone, teletype, or other method of communication. Such freedom of access and obligation to serve libraries which do not have terminals must be acknowledged through a formal policy statement.

   Conversely, wherever possible, the NELINET Interlibrary Loan System should provide access to the collections of all libraries in New England. Such access may be direct or indirect, e.g., through an on-line library which maintains an area, region or state union catalog. While it is probable that some libraries may never enter their holdings in a single data file (shared data may take any physical form, e.g., a card union catalog) the system should be structured to encourage libraries to add their holdings.

   The NELINET Interlibrary Loan System should be designed to allow participating libraries to continue with existing resource sharing arrangements.

   To facilitate the use of other data bases for ILL purposes, and to anticipate possible changes of source of data, all software designed for the system should be compatible with other existing and emerging library communication systems.

4. The system must be capable of operating as a regional node in any national network.

   The system should monitor changes in regional and national interlibrary loan distribution and provide information to help the development and modification of policies to influence these changes.

5. The system must provide management reports to both network headquarters and to the participating institutions (e.g., elapsed times, loans by institution, cost data, debit/credit data, etc.).

The measure of effectiveness of a library's ILL system and of its services is generally reported in the form of circulation statistics. More detailed record keeping, which could give meaningful evaluative results, is usually confined to short periods of special studies during which personnel are asked to invest added time to manually maintain addition figures for some given purpose.

With a computer-controlled ILL system it should be possible to routinely compile a variety of data. The data could also be collated to provide interlibrary comparisons. Such a system could also compile information to measure its own effectiveness.

Examples of information which might be captured would be "request/fill ratio," elapsed time of filling the request or reporting, comparative usage of participants, reasons for non-completion of loans, percentage of loans which cannot be filled within New England, costs of using the system, etc.

To be meaningful, comparative data should also be obtained for a period before any system becomes operational. This would give figures against which the machine-based system could be judged. The Committee should design and implement such a procedure.

The information gathered by the system should provide libraries with figures which will enable them to test more accurately the effectiveness of their service. Tangentially it might also serve as a basis on which to judge the adequacy of their own collections.

6. The system should shorten the average turnaround time of delivery of materials to users.

   The attainment of this objective will improve the ILL process, assuming the following statements to be correct:

   1. Interlibrary loan will become more responsive to user needs in terms of faster response time and higher fill rate.

   2. Load-leveling should improve overall retrieval time, thus contributing to improved delivery.

   3. The increased system load will be handled without parallel increase in staff.

   4. Those current systems which are now dependent upon U.S. mail are unable to improve turnaround times, whereas communications via terminal would accomplish this goal.

5. The system should prevent lending institutions from retaining requests for lengthy periods without explanation to the borrowing institution via the network.

6. The system will permit the librarian to check on the status of a request to respond to user demands.

To implement this objective the system must:

A. provide for speedy delivery of requests from terminal to terminal

B. provide for a time limit on responses to loan requests

C. provide screen formats showing the status of a request so that the borrowing institution and the patron will be aware of the progress of an item through the system

D. reduce the time spent transferring information from form to form

E. introduce an automatic referral system to reduce delays due to "unfilled" requests

F. provide improved verification methods and procedures to reduce turnaround times due to unverified items

G. encourage libraries to borrow from the small institutions which have a small ILL load, and may thus tend to reply to ILL requests more quickly

NOTES:

Expansion of ILL staff in medium-small libraries will probably be needed if demand upon them will be increased.

Some smaller institutions will increase the staff needed to process incoming ILL requests.

NYSILL found that the price of increased response time provided by facsimile transmission did not really increase response time--users did not pick up materials much, if any, faster. Documentation on this point is needed.

7. The system should allow for improved speed and accuracy of bibliographic verification processes.

According to the literature, verification is the most important single step for the smooth operation of the rest of the system.

The single biggest problem in delay of requests is also a lack of verification. NYSILL studies show a direct relation between the turnaround times for items and their verification or lack thereof (4.2 day/req. with verification, 11.05 days/req. without verification).

The NELINET subsystem will improve verification by:

A. making the OCLC record available for the ILL screen

B. combining verification information with location information

C. supplying the OCLC number automatically for items requested which are in the OCLC data bank

To implement improved verification the system should:

1. provide for system-supplied verification for items verified through the terminal

2. provide for mandatory verification of requests to encourage correct verification procedures

NOTES:

A fee system for those items not verified could be instituted should a "regional verification center" for libraries which cannot verify items be established.

8. The system must support existing interinstitutional resource sharing arrangements (e.g., BTI, WACL, CRLC, various statewide arrangements) and encourage the development of further such systems. Libraries should have the option to establish a preferential borrowing group in their ILL profile.

   Any New England interlibrary loan system should take into consideration other existing and potential resource sharing arrangements involved with ILL or other cooperative services, e.g., reference, in order that the overall communication plan will interface wherever possible. The sharing by NELINET of its experience and expertise with such groups will help avoid wasteful duplication of effort and assure a uniformity necessary to the larger systems. Encouraging local systems will help to make possible the inclusion of nonmember libraries in whatever network may evolve, and put it in line with the national goal.

   The National Commission on Libraries and Information Science, in its Report, Toward a National Program for Library and Information Services; Goals for Action, recognizes the need for resource sharing through consortia and larger networking.

Any policies which NELINET adopts must be consistent with the NCLIS Report and conducive to the continuance and the development of such efforts. Funding of applications for grants and Federal support will inevitably be affected by their conformance to national policy. The system should help implement the national plan.

9. The system must provide monitoring of the performance of network ILL participants on a cooperative basis.

   While it is hoped that the need will be nil, such a system must have some provision for dealing with apparent abuses. An impartial panel composed of representatives of participating libraries should be available to hear complaints.

10. The system should encourage resource sharing within New England wherever possible.

    The "regional" aspect of this proposal cannot be overemphasized. The exploitation, to the fullest extent, of the resources in the New England area can best be accomplished by encouraging requests to be filled in the region whenever possible. Only after the region's possibilities have been exhausted should a request be transmitted outside New England. The result will be a higher degree of cooperation within the region.

11. The system must permit ILL librarians not only to tailor their request through individual profiles, but to determine which institutions shall be queried for each transaction.